ALLEN GROUP TRAINING TECH TOPICS

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The *Scope Book* arrives

Dave Chamberlain

It's Here! *The Scope Book: Smart Diagnostics in the Age of Computers* is ready. This all-new book was written by John Melo and Dave Chamberlain and demonstrates real world diagnosis using single and dual-trace live oscilloscopes.

The chapters are: About Oscilloscopes, Ignition Primary, Ignition Secondary, Distributorless Ignition, Sensor/Actuator Testing and Advanced Dual-Trace Diagnostics. This book is hot.

When you get one, you'll want to take it home and read it cover to cover. There is some general information, specific diagnostic data, and lots of patterns.

We're also finishing up a formal Advanced **SEA**/Scope class presentation (slides, instructor guide) that uses *The Scope Book* as a syllabus. Use *The Scope Book* as seminar material for the class (don't give it away, though).

You can also include it with technical presentations when you're addressing local service organizations or doing seminars. Use it when arranging training with a large account.

Salespeople can use it to demonstrate why a customer needs a live dual-trace 'scope or use it as a "closer" with a scope sale. It's also going to be featured as part of a May sales special.

The Scope Book is available for retail sale and you can offer it to vocational schools in your area as textbook. Contact me for pricing information.

Part number is 35115. It will be available in quantity in May.

EXOTIC!

Complete systems test on Ferrari

Tom Vardigan, Kalamazoo Engineering

The Ferrari 308 quattrovalvole (best known as "Magnum P.I.'s" car) has a transverse mounted 3.2L (194 cid) V8 equipped with Bosch K-Jetronic fuel injection and dual electronic ignition systems with variable dwell. Each ignition system has its own crankshaft-mounted inductive pickup as a triggering device.

As far as new Ferraris go, this one is the most common. There are a lot more 308s out there than Mondials or Testarossas.

We performed testing procedures with both the **SEA** and **DEA**.

Procedure:

1) Hook up the following leads as usual: Battery Black and Yellow Leads, Current Probe, Vacuum Pickup, Sync Probe
2) Insert the Test Coil Wire (from the accessory kit) between the coil and coil wire. Attach the **Secondary Clip** to the Test wire. The Ferrari's wires have rubber sleeves over all the secondary wires which cause low kV readings.
3) Insert a jumper wire with male and female $\frac{1}{4}$ spade connectors (also from the accessory kit) between the coil negative terminal and the coil wire. This makes it easier to connect the **Green Lead**.
   PRIMARY CONNECTIONS
   Front Bank of Cylinders: **Yellow/Black** coil primary wire.
   Front Bank of Cylinders: **Green** coil primary wire

Note: Connect Primary, Secondary and Sync Probe to the same bank of cylinders (front or rear).

4) Enter the engine as **4-cylinder**.
5) Test one ignition system at a time. For cranking tests, an assistant should disconnect the coil primary from the ignition system not connected to the analyzer. All other tests operate normally.

Vacuum sources on fuel-injected cars

Jim Harnsberger, Performance Development and Research Enterprises, Urbana, IL

When performing diagnostic tests on a fuel injected car, especially with a **Smart Engine Analyzer**, do NOT hook the vacuum line to the fuel pressure regulator hose. This is a dampened signal (The fuel and diaphragm can act as a shock absorber under some conditions) and the vacuum hose is usually too small.

Instead, connect the analyzer to the **EGR** solenoid control hose. You will get a much improved printout.

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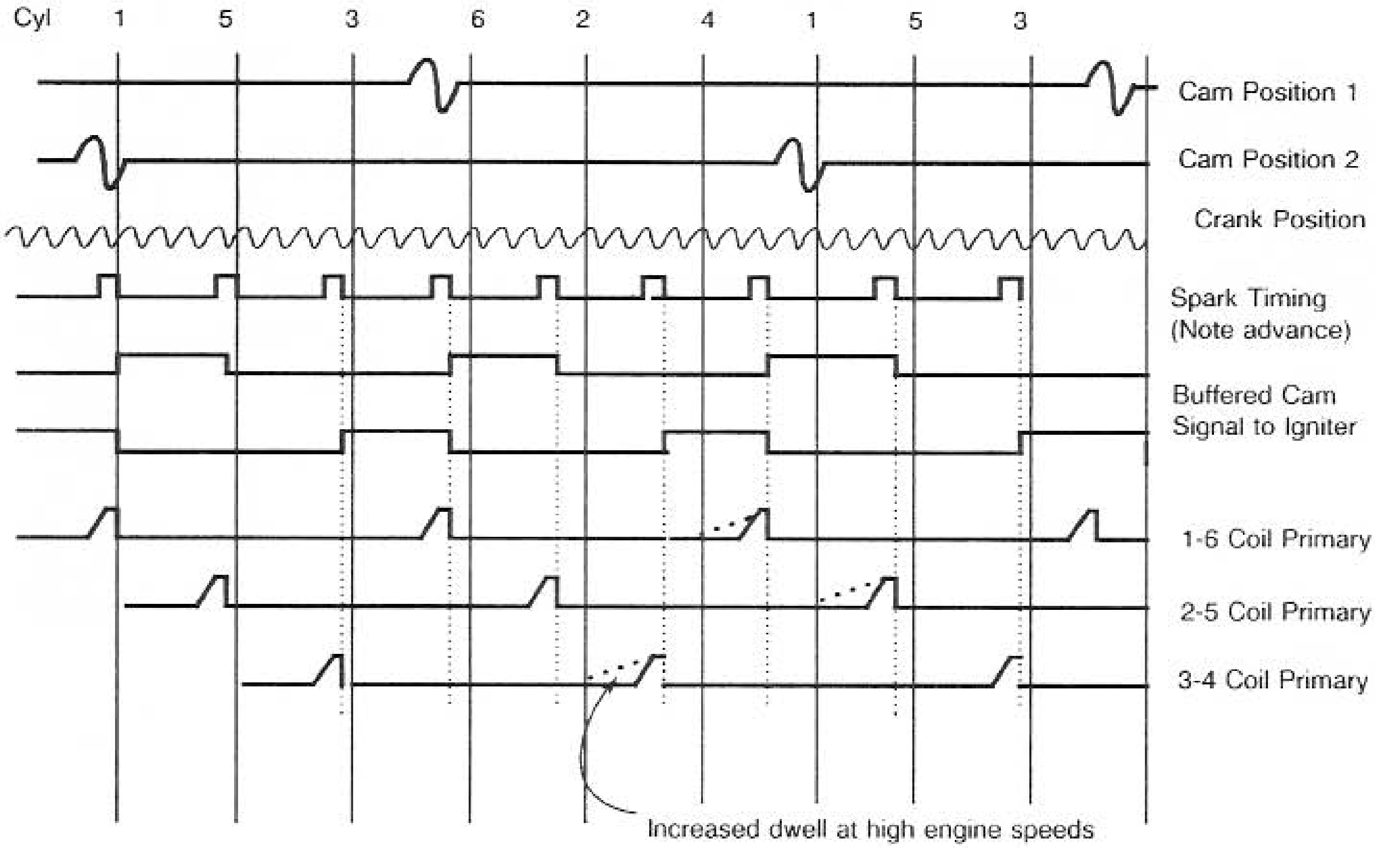
Signal tracing - Toyota DLI (distributor-less ignition)

Ken Dubrovin, Denver

Toyota is now suggesting the use of an getting on oscilloscope for driveability diagnosis. Here is a sample of what they're publishing for their Distributor-Less Ignition system installed on the turbocharged 7M-GTE engine in the Supra.

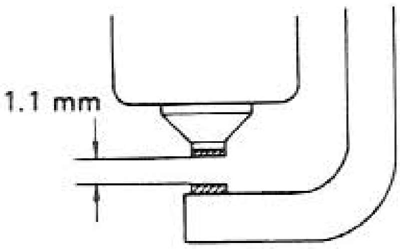
Signal	**ECU Term.**	**Color**
Cam 1	6	Red
Cam 2	5	Yellow
Crank Position	4	Purple
Spark Timing	3	Light Green
Buffered Cam 1	12	Purple/Blue (?)
Buffered Cam 2	2	Purple/White (?)

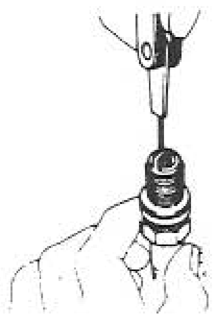


Servicing Nippon Denso platinum spark plugs

Toyota Service News

Toyota is supplying Nippon Denso platinum-tipped electrodes as the new generation of high performance spark plug. Unlike the Bosch platinum (which has a fine wire electrode wrapped in ceramic) the ND plug has a layer of the precious metal added to both electrodes.





Service Tips

- Never clean with a wire brush
- To adjust the gap on a new plug, bend only the BASE of the ground electrode. No not touch the tip.
- Never attempt to adjust the gap on used plugs
- Replace plugs at 60,000 miles or 6 years under normal operating conditions

Models	**Engines Affected**
Corolla, FX-16, MR2	4A-GE
MR2 Supercharged	4A-GZE
Celica	3S-GE, 3S-GTE
Supra	7M-GE, 7M-GTE
Cressida	5M-GE
Van	3Y-E, 4Y-E

Notice that turbocharged engines have the "T" in the suffix and the supercharged engine has a "Z."

32-570 adapter secondary connections

Lou Craven, St. Louis

When connecting secondary leads to Distributorless Ignition Systems, you must connect them as close to the coil as possible for correct secondary kV readings.

Example: 2.8L engine.

When the Secondary Leads were connected too close to the spark plug, the **SEA** did not pick up a weak spark plug wire. The problem was upstream of the secondary lead. The secondary oscillations (the "ringing" in the primary) don't have enough energy to overcome the excess resistance in the plug wire. Therefore, we see only part of the secondary pattern. (See Ray McWherter's article in TTT #25 July, 1987).

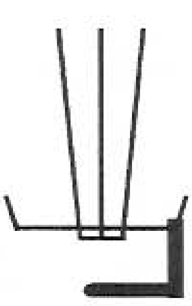
Bosch platinum plugs in distributorless ignition

John Melo, Kalamazoo

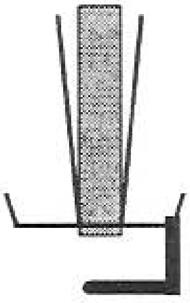
If some conscientious owner has replaced the standard plugs on his DIS/C^{3}I ignition with Bosch Platinum plugs, you may see some unusual kV spikes on your oscilloscope. Here's the reason:

We remember from basic ignition that the plug fires from the hot center electrode to the cooler side electrode. On the other end of the coil, though, it's firing with the opposite polarity. That changes the ignition demand, particularly at idle.

With Bosch Platinum, the center electrode is completely encased in the ceramic insulator, so it is hotter than conventional plugs. That increases the demand in the reversed-polarity cylinder (and decreases it on the straight-polarity end). When testing with an oscilloscope, you'll notice an even more pronounced lo-hi kV height difference if the customer has installed Bosch Platinum plugs.



Bosch



Conventional

Cylinder time variations - Ford with CFI

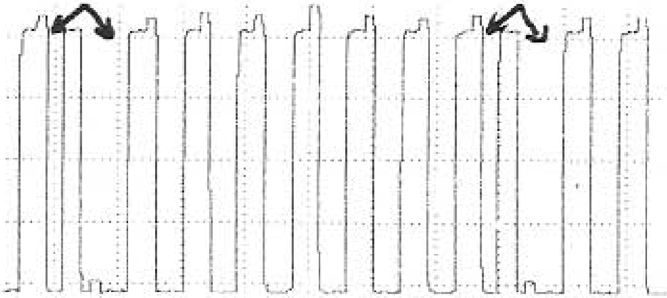
Jon Kirby, Lenexa, Kansas

Vehicle: Ford Mustang 5.0L with Central Fuel Injection (CFI)

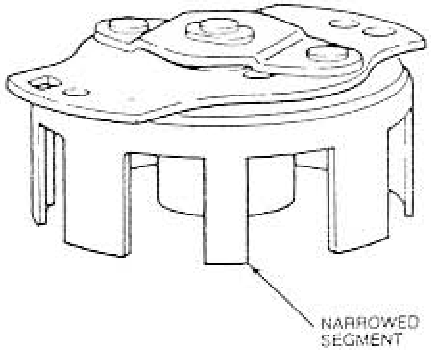
Problem: Poor idle, Runs OK at higher speed.

Diagnostic Printout: The **SEA** complete systems analysis showed excessive cylinder time variations (-7 7 1 0 0 0 0 0) on the first two cylinders.

Verification: Oscilloscope pattern. The Profile Ignition Pickup (PIP) reference signal from the distributor trigger indicated a time variation every 8th signal. This signal was much earlier than the other signals (the -7 reading) and narrower, which made the next signal much later (+ 7).



Diagnosis: This vehicle had been to two other shops. One had installed a "Signature PIP" armature in the distributor. This armature is intended only for 1986 and newer Sequential Electronic Fuel Injection (SEFI) engines. The signal confused the CFI processor. The correct armature fixed the problem



Testing Ford Programmed Ride Control (PRC)

Tim Cooper, Kalamazoo

A few words of caution about testing the **Programmed Ride Control** system on the **1988 Lincoln Continental** . . .

After the "Check Suspension" light comes on, you must perform the Suspension Test within *one hour* to extract any valid service codes; otherwise, the codes are erased. That's right--*gone*.

This means if a customer brings you his car a week after he notices the idiot light is on, you should take the car out for a drive to set the codes.

And one more thing--don't restart the engine until you complete the Suspension Test or the previously stored PRC Service codes will be replaced by code 55 (over 15 MPH not sensed).

Preventing processor failure - new Ford starter solenoid

Jim M. Lawrence, Kleim Automotive, Fresno,California

Ford starter solenoids built since 1985 contain a diode that eliminates the voltage surge. When diagnosing a computer failure on Ford vehicles, consider the starter solenoid as a possible cause of intermittent high-voltage spikes.

There are the Motorcraft part numbers for the solenoids with diodes.

Production # (delivered on the car)	**Service #** Dealer (Aftermarket)
E4TF 11450 AA E5DF 11450 AA	E5TZ 11450 A (SW1951)
E4AF 11450 AA	E5AZ 11450 A (SW1533)

ALLEN in print

Toyota Service has launched an advertising campaign recommending the use of genuine Toyota Parts and Service. A 4-Gas **Smart Engine Analyzer** is a big part of their print ads. See it on page 92 of the May edition of *Car and Driver*, *Money* magazine and others.

Also, if you're one of the few that actually found the Hot Rod Swimsuit Issue before it sold out, you saw a Blue Line scope on page 25. You'll have to move your gaze slightly from the swimsuit in order to find the scope...

Chrysler O2 feedback slides

You can now order Chrysler O2 Feedback slides under a single part number, instead of the three dash numbers we were using before. The number is 35062.

Babies

Training Department families have added several new girls to their rosters.

Samantha LaRue Balash's daddy works in Indianapolis. She was born March 25, 1988

Carly Christine Chamberlain (Dave Chamberlain's kid) was added to the Kalamazoo staff January 30, 1988.

Andrea Marie Leach was born in March 15, 1988. Her papa, John, is the instructor at the Bristol, PA facility.

Tech Update

Service bulletins

John Melo, Kalamazoo

CHEVROLET

APPLICATION:

1987-88 Cavalier, Corsica, and Beretta with 2.0L (VIN code 1) engine.

Symptom: Intermittent engine miss, backfire or hesitation.

Cause: Loose battery negative cable-to-transaxle connection. A poor connection at the transaxle causes the Direct Ignition System (DIS) module to misinterpret it as a crank sensor signal.

Fix: Trace the battery ground wire to the transaxle and verify a secure connection. Torque the cable/strap to 10-14 N.m (7.5 - 10 Ft. Lb.).

APPLICATION:

1987 M and S/T trucks with 2.5L engine (VIN code E).

Symptom: Unstable idle, surge on deceleration, false code 42-Electronic spark timing, and detonation on manual transmission.

Cause: If you perform all the normal service procedures (All systems, etc.) and are unable to find the problem, replace the PROM with a corrected calibration.

Fix: Install new PROM according to the following chart:

MODEL	ENGINE	TRANS	NEW PROM #
M van	2.5L	4 spd. man.	16074854
M van	2.5L	5 spd. man.	16074858
M van	2.5L	4 spd. auto.	16074864
Blazer/Jimmy (2 and 4WD)	2.5L	4 spd. man.	16073744
S-Pickup(2 wd)	2.5L	4 spd. man.	16074844
T-Pickup(4 wd)	2.5L	4 spd. man.	16073744
T truck 4 wd	2.5L	5 spd. man.	16074844
S truck 2 wd	2.5L	5 spd. man.	16074888
T truck 4 wd	2.5L	4 spd. auto	16074894
S truck 2 wd	2.5L	4 spd. auto.	16071197

Note - - - Note - - - Note

This is a 1988 PROM installed in a 1987 vehicle. Vehicles with the new PROM have a modified data stream. When using Full-Chart data, enter the vehicle as a 1988 with **SEA** Version 6, **Smart Scope** Version 12 and **DEA** 1988 On-Board Computer update.

If you're using earlier software, enter the vehicle as a 1987. The following data will be correct: Prom ID, Trouble Codes, Coolant Temp, TPS, RPM, Integrator/Block Learn, Idle Air Control, MAP. Other data may not be valid due to this PROM change.

CHRYSLER

Application:

1988 M body with 5.2L engines (number 1 in the sixth position of the VIN).

Symptom: Stalling during cold start or rough running during warm up.

Cause: Incorrect Electronic Spark Advance calibration.

Fix: Remove old spark advance computer and EGR valve and install new the following parts:

1 ESA module	PN 4379555
1 EGR valve	PN 4287667